

a device (93, 193) for forming a bump (3, 103), without leveling, by forming a ball (96, 96a) by an electric spark at a tip of a metal wire (95) on an electrode (2) of the electronic component (1) similarly to wire bonding and forming by thermocompression-bonding this to the electrode of the board with supersonic waves by means of a capillary (93, 193);

a device (600) for mounting the electronic component on the electrode (5) of the circuit board (4) through positional alignment; and

a device (8, 9) for bonding the electronic component to the circuit board by hardening the insulating resin interposed between the electronic component and the circuit board while correcting warp of the board with a pressure force of not smaller than 20 gf per bump applied to the electronic component against the circuit board with heating by means of the tool (8), electrically connecting the electrode of the electronic component with the electrode of the circuit board.

34. An electronic component mounting apparatus comprising:

a device (7, 109, 200, 201) for sticking a solid or semi-solid insulating resin layer (6, 306b), in which an insulating resin (306m) is mixed with an inorganic filler (6f), to an electrode (5) of a circuit board (4) or an

electronic component (1);

a device (93, 193) for forming a gold bump (3, 103), without leveling, by forming a ball (96, 96a) by an electric spark at a tip of a metal wire (95) on an electrode (2) of the electronic component (1) similarly to wire bonding and forming by thermocompression-bonding this to the electrode of the board with supersonic waves by means of a capillary (93, 193);

a device (600) for mounting the electronic component on the electrode (5) of the circuit board (4) through positional alignment;

a device (620) for metallically bonding the gold bump to the electrode of the board with supersonic waves applied while shaping the tip so as to prevent collapse of a neck portion of the gold bump with a load applied from an upper surface of the electronic component by means of a tool (628); and

a device (8, 9) for bonding the electronic component to the circuit board by hardening the insulating resin interposed between the electronic component and the circuit board while correcting warp of the board and crushing the bump with a pressure force of not smaller than 20 gf per bump applied to the electronic component against the circuit board with heating by means of the tool (8), so that the electrode of the electronic component is

electrically connected with the electrode of the circuit board.

35. An electronic component mounting apparatus comprising:

5 a device (7, 109, 200, 201) for sticking a solid or semi-solid insulating resin layer (6, 306b), in which an insulating resin (306m) is mixed with an inorganic filler (6f), to a circuit board (4) or an electronic component (1);

10 a device (93, 193) for forming a bump (3, 103), without leveling, by forming a ball (96, 96a) by an electric spark at a tip of a metal wire (95) on an electrode (2) of the electronic component (1) similarly to wire bonding and forming this on the electrode of the board
15 by means of a capillary (93, 193);

a device (600) for mounting the electronic component on the electrode (5) of the circuit board (4) through positional alignment; and

20 a device (8, 9) for hardening the insulating resin interposed between the electronic component and the circuit board while correcting warp of the board with a pressure P1 applied as a pressure force to the electronic component against the circuit board and heat applied from an upper surface of the electronic component by means of a
25 tool (8) heated to a specified temperature and subsequently